REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-2 and 8-12 are presently active in this case. Claims 1-2 amended, Claims 3-7 canceled and Claims 8-12 added by way of the present amendment.

In the outstanding Office Action, Claim 1 was objected to for informalities; Claims 3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite; and Claims 1-7 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,492, 585 to Zamboni et al.

With regard to the objection to Claim 1, this claim has now been amended to correct the informalities noted in the outstanding Office Action. Therefore, the objection has been overcome.

With regard to the rejection under 35 U.S.C. § 112, second paragraph, Claims 3-7 have now been canceled. Therefore, the rejection is moot.

Turning now to the merits, in order to expedite issuance of a patent in this case, Applicants have now amended Claim 1 to include the subject matter of the original Claims 3 and 4 in clarified format. Specifically, Claim 1, as amended, recites a single-stage thermoelectric converting device including a P type thermoelectric element, an N type thermoelectric element and an electrode circuit contacting an end of the P type thermoelectric element and an end of the N type thermoelectric element for establishing an in-series connection there between. Also recited is an insulation substrate including a plurality of penetration bores and an electric circuit, the electric circuit, the insulation substrate, and the electrode circuit being formed into a layered structure wherein the electrode circuit and the electric circuit are provided at opposite sides of the insulation substrate respectively. Further

recited is a conduction member passing through the penetration bores of the insulation substrate and electrically conducting the electrode circuit and the electric circuit.

Thus, Applicants' amended Claim 1 is directed to a single-stage thermoelectric converting device. This term is well known to those skilled in the art to apply to the thermoelectric converting device described in the specification as originally filed. Further, Claim 1 recites that penetration bores of the insulation substrate are located between the electric circuit and the electrode circuit. These penetration bores allow the conduction member, which is in contact with the electric circuit, to establish electrical connection to the electrode circuit that connects respective ends of the P-type and N-type thermoelectric elements on the common insulation substrate.

In contrast to the single-stage thermoelectric device of Applicants' invention, Zamboni et al. discloses a so-called cascade-type or multi-stage type thermoelectric converting device. As seen in Fig. 7E of Zamboni et al., a through hole 835 (corresponding to the bore) is formed in a plate 823 (corresponding to the insulation substrate), which allows the metal 836 and 837(corresponding to the conduction member) to establish an electrical connection between the interconnects 829 and 832 (corresponding to the electrode circuits) of the respective ends of the thermoelectric elements 830 and 826. However, unlike the claimed invention, the metal 836 and 837 is not in association with the plate 822 (corresponding to the electric circuit). Rather, the metal 836 and 837 establishes electric connection between the vertically aligned or arranged thermoelectric elements 826 and 830. Thus, unlike the claimed conduction member, the metal 836 and 837 is not a member which establishes an electric connection between thermoelectric elements on a common insulation substrate.

More specifically, Claim 1 recites that the electrode circuit and the electric circuit are provided at opposite sides of the insulation substrate respectively, and that the electrode circuit connects P and N elements. This requires that the P and N elements are provided on a

same side of the insulation substrate. However, the P and N elements in Zamboni et al. are provided on different sides of the plate 823 and connected by metal 836 and 837. Thus, Zamboni et al. does not disclose all of the features recited in amended Claim 1, and Claim 1 patentably defines over this cited reference.

As Claims 2 and 8-12 depend from Claim 1, these dependent claims also patentably define over the cited references. Nevertheless, such dependent claims provide an additional basis for patentability over the cited references.

Specifically, Claim 8 recites that the electric circuit comprises a plurality of electric circuits, at least one electric circuit connecting a P type thermoelectric element to an N type thermoelectric element in a different linear array of elements. This claim is supported at least by Figures 5, 6, 10 and 11 of Applicants' specification as originally filed, and therefore does not raise an issue of new matter. An example thermoelectric converting device covered by Claim 8 is shown in Figure 6 of Applicants specification. As seen in this figure a circuit for the cooling side electrode circuit 10 is used to connect P and N elements (solid lines). In addition, a combination of a circuit for the heat radiating side electrode circuit 6, the conduction member 9, and the electric circuit 7 are also used to connect P and N elements (dashed lines). Thus, the electric power supplied to the heat radiating side electrode circuit 6 is supplied to the P type semiconductor chip 4a and the N type semiconductor chip 4b, which are connected alternately to be arranged electrically in series. As discussed in Applicants' specification, a thermoelectric converting device having such structure provides improved cooling performance with reduced assembly time.[1]

In contrast, as seen in Figure 3 of Zamboni et al., this reference discloses only linear connections of adjacent P and N elements. Thus, Claim 8 provides an additional basis for patentability over the cited references.

[1] Applicants' specification at paragraphs 37-38.

Claim 9 recites that the at least one electric circuit connects a P type thermoelectric element to a diagonally adjacent N type thermoelectric element in a different linear array of elements, and Claim 10 recites that the at least one electric circuit connects a P type thermoelectric element to a non-adjacent N type thermoelectric element in a different linear array of elements. Claims 9 and 10 are supported at least by Figures 6 and 11 of Applicants' specification respectively. Claim 11 recites that the electrode circuit comprises a plurality of electrode circuits each connecting a P type thermoelectric element to an N type thermoelectric element in a same linear array of elements. This feature is shown at least in Figures 3 and 8 of Applicants' specification. Claim 12 recites that each electrode circuit connects a P type thermoelectric element to an N type thermoelectric element on a same side of the insulating substrate. This feature is shown at least in Figure 2. Therefore, Claims 10-12 do not raise an issue of new matter. Further, Zamboni et al. does not disclose this further detailed structure, and Claims 10-12 provide an additional basis for patentability over the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application and the present application is believed to be in condition for allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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